PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : B65D 35/08 | A1

(11) International Publication Number: WO 00/12401

(43) International Publication Date: 9 March 2000 (09.03.00)

(21) International Application Number: PCT/US99/19101

(22) International Filing Date: 23 August 1999 (23.08.99)

(30) Priority Data:
09/141,174 26 August 1998 (26.08.98) US

(71) Applicant: COLGATE-PALMOLIVE COMPANY [US/US]; 300 Park Avenue, New York, NY 10022 (US).

(72) Inventor: McLAUGHLIN, Heather, Larkin; 141 Roxboro Road, Lawrenceville, NJ 08648 (US).

(74) Agent: McGREAL, Michael, J.; Colgate-Palmolive Company, 909 River Road, P.O. Box 1343, Piscataway, NJ 08855-1343 (US).

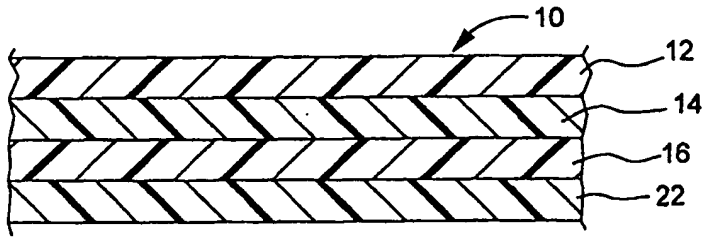
(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: HOLOGRAPHIC DECORATED TUBE PACKAGE

(57) Abstract

The tube has a non-metallized holographic decoration. This holographic decoration is an inner layer (14) of the tube body which is of a laminate structure (16). The holographic film layer (14) is a non-metallized layer to prevent the delamination of the tube body when the tube body is formed with an overlap seal. In an overlap seal an edge of the laminate film potentially will be in contact with the contents of the tube (32). A metallized holographic layer can react with the contents of the tube (32) and cause a delamination of the film in the area of the seal and the consequent failure of the seal. The innermost (22) layer of the tube body will be a layer that is bondable to an outermost (12) barrier layer, and further that is bondable to the shoulder (30) of the tube. It should be bondable to the innermost layer in order to form the longitudinal seal of the tube body. It should be bondable to the shoulder since the primary bond of the shoulder to the tube body is of the shoulder to the innermost layer of the tube body. The innermost layer and the outermost layer preferably are polyene layers. Polyenes form good heat bonds, and in particular, polyene to polyene bonds. Therefore, it is preferred that in addition to the innermost barrier layer and the outermost layer, the shoulder also be comprised of a polyene.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

HOLOGRAPHIC DECORATED TUBE PACKAGE

Field of the Invention

This invention relates to a tubular container that has a holographic decorative layer as an integral part of the tube structure. More particularly, this invention relates to a laminate structure for a tubular container where the holographic film layer is a non-metallized layer and is adjacent an exterior layer of the tube laminate structure.

Background of the Invention

Tube containers can be decorated in various ways depending on the structure of the tube container and how it is made. By decoration is meant all of the indicia that is placed on the tube. This includes brand names, designs and general information printing. Tube containers can be decorated before or after being fully formed. Laminate tubes can be decorated before the tube is fully formed. The webstock from which the body of a laminate tube is formed will be printed when in sheet form with this printed webstock then being formed into the tube body. This webstock can be printed on the exterior surface, or on an inner layer of the laminate. An inner layer such as a paper or film layer can be printed with the decoration. If the tube body is made by extrusion molding or by blow molding, it usually will be decorated after the tube body or tube has been made and prior to filling and sealing. In this latter instance, each tube is put onto a mandrel with the tube surface being printed by relative motion between the tube and a print surface. In such tubes the tube decoration is on the exterior surface. Any one of these techniques can be used to

decorate conventional tube containers, such as those used for dentifrices, lotions, shampoos, ointments, hair dressing, foods and other products packaged in tubes.

A new type of decoration for a tube container is holographic decoration. Such a decoration cannot be printed onto the exterior surface of a formed tube. A tube construction technique that can be used for creating holographic effects is a laminate tube. However in use with laminate films there is a tendency for the holographic films to delaminate. One reason is that the traditional holographic films are metallized films. Such metallized holographic films, their structure and their manufacture are described in U.S. Patent 5,200,253. However since in most laminate tubes there will be an overlap longitudinal seal, one edge of the laminate will potentially be exposed to the contents of the tube. This presents the problem of the tube contents reacting with the metal in the holographic film with a delamination of the film. Such a delamination in the area of the longitudinal seal will cause the longitudinal seal to weaken and in many instances to fail.

This problem is solved in the present tube containers since the holographic film will be a non-metallized holographic film. It usually will be a polyester film. Also since polyester films have low moisture barrier properties they will have to be used in the form of a laminate with another film providing the needed moisture barrier properties. Further since the holographic film will be a polyester film it has been found that it cannot be the outermost layer or innermost layer of the tube laminate structure. This is the case since in the construction of a laminate tube the innermost layer must be a layer that can be heat bonded or compression molded to the upper shoulder part of the tube, and heat bonded to the outer laminate layer in forming the longitudinal

overlap seal to form the tube body. In the heat bonding of the shoulder to the tube body, the shoulder is made separately from the tube body and bonded by heat to the shoulder. The inner layer of the tube body is bonded to the shoulder. In compression molding of the shoulder to the tube body, the shoulder is formed onto the tube body. That is, it is simultaneously formed and bonded to the inner film layer of the tube body. The longitudinal overlap seal is produced by heat and pressure on the two overlapped edges of the laminate (edge of inner layer and edge of outer layer) to form the sheet webstock into the tube body.

Whether the shoulder is attached to the tube body by heat bonding or compression molding, and forming the longitudinal overlap seal by heat bonding, the innermost layer of the tube body must be of a plastic bondable to the tube shoulder, and to the outermost layer of the tube body. Since like plastics bond best to like plastics, the innermost layer of the webstock preferably should be the same as the shoulder and as the outermost layer of the tube body. Since the shoulders are usually made of a polyene polymer such as polyethylene, polypropylene, polybutene, polybutadiene or an ethylene-propylene copolymer, the innermost layer should likewise be a polyene, and preferably the same polyene. Consequently the preferred structure for the present laminate is a polyene layer bonded to each side of the polyester holographic film. Polyenes provide a good moisture barrier and bond well to the same or other polyenes. Such a structure will provide for a good bond to the shoulder, a strong longitudinal seal and a durable crimp seal at the bottom of the tube.

Summary of the Invention

The present invention is directed to a tube that has holographic decoration. Such a tube will have a laminate structure tube body that is bonded to a shoulder by heat bonding or compression molding. The body of the tube will have a multilayer laminate structure of an outer polyene layer and at least one inner layer that is a non-metallized holographic film layer. There can, and usually will be one or more other inner layers. That is, there preferably at least will be an innermost polyene polymer moisture barrier layer, the holographic film layer and the outermost layer. There can be additional barrier layers such as an organic barrier layer. A polyene polymer is an alkene polymer such as polyethylene, polypropylene or ethylene-propylene copolymers. Suitable organic barrier layers are comprised of homopolymers and copolymers of vinyl alcohol and of vinyl acetates. These include ethylene vinyl alcohols and ethylene vinyl acetate. In addition, there can be film tie layers between a barrier layer and the holographic film layer and between the holographic film layer and the outermost layer, which usually is a polyene layer. There also can be tie layers between inner barrier layers when there is more than one inner barrier layer. As noted, the shoulder is bonded to the outermost layer. In a preferred embodiment the shoulder is comprised of a polyene and the outermost layer is a polyene.

The holographic film layer is a non-metallized film layer. This usually is a polyester such as polyethylene terephthalate or polyethylene naphthanate. The holographic effect is formed on the surface of the film through the use of various printing and embossing techniques. A metallized layer is not used. A metallized layer would have a tendency to delaminate along the longitudinal seam of the tube

by reaction of the contents of the tube with the metal of the metallized. Such a delamination would cause the tube to fail along the longitudinal seam.

The net result is a tube that has a holographic decoration, the tube body via the innermost film layer is readily bondable to the shoulder, and the innermost layer also is readily bondable to the outermost layer. Further, the tube body is not susceptible to delamination at the longitudinal seal due to the fact that the holographic film is not a metallized film.

Brief Description of the Drawings

Figure 1 is a cross-section of the holographic laminate film.

Figure 2 is a cross-section of the holographic laminate film of **Figure 1** showing adhesive tie layers.

Figure 3 is an elevational view of a holographic tube showing the longitudinal seal.

Figure 4 is a cross-sectional view of the overlap longitudinal seal on the tube body along line 4-4 of **Figure 3**.

Detailed Description of the Invention

The invention will be described in detail with reference to the preferred embodiment shown in the figures. In **Figure 1** the laminate **10** is comprised of outer layer **12**, a non-metallized holographic film layer **14**, first inner barrier layer **16**, and a second inner barrier layer **22**. The second inner barrier layer **22** must be bondable to the shoulder of a tube. It also must be readily bondable to the outer layer **12** since the longitudinal seal of the laminate tube usually is an overlap seal. In such a seal the inner layer of one edge of the laminate will overlap the outer layer of another edge of the laminate as is shown in **Figure 4**. This exposes an edge of the laminate to the contents of the tube. It is for this reason that the holographic layer is a non-metallized layer and is essentially non-reactive with the contents of the tube. In most instances the polymer of this outer layer **12** and the second inner barrier layer **22** will be a polyene such as polyethylene, polypropylene, polybutene, polybutadiene or ethylene-propylene copolymers. The holographic film layer **14** can be any plastic used to produce holographic films and usually will be a polyester. Suitable polyesters are polyethylene terephthalate and polyethylene naphthanate. Either inner barrier layer can be a moisture barrier layer or an organic barrier layer. Polyenes are suitable as moisture barrier layers. Useful polyenes as previously set out are polyethylene, polypropylene, polybutene, polybutadiene and ethylene-propylene copolymers. However, polyenes are not very effective organic barrier layers. Useful organic barrier films are homopolymers and copolymers of vinyl alcohol and vinyl acetate such as ethylene-vinyl alcohol and ethylene vinyl acetate. Preferably the outer layer **12** and the second inner layer **22** are of the same polymer. The various film layers can be bonded directly one to the other, or can be bonded indirectly through

the use of tie layers. The use of tie layers to bond the film layers of the laminate is shown in **Figure 2**. Here outer layer **12** is bonded to holographic film layer **14** by tie layer **18,** the holographic film layer is bonded to the first inner barrier layer **16** through tie layer **20** and the second inner barrier layer **22** is bonded to the first inner barrier layer **16** through tie layer **24**.

The tie layers are comprised of good adhesives. Suitable tie layer polymers are acrylates such as ethyl methyl methacrylate polymers and ethylene acrylic acid polymers.

The laminate is produced in a continuous sheet with these layers. The holographic film layer will provide a background decoration. Conventional laminate forming equipment can be used.

Figure 3 shows a completed tube **30**. This is comprised of tube body **32** and tube shoulder **34.** The tube shoulder has an externally threaded exit nozzle **36**. The tube body **32** is comprised of a laminate of the structure of **Figure 1** or **Figure 2**. There is a longitudinal overlap seam **40** extending from the shoulder **34** of the tube to the crimp seal **38**. The structure of this seal is shown in more detail in **Figure 4**. End **44** of the laminate overlaps end **42**. The second inner barrier film layer of end **44** bonds to outer film layer of end **42**. An overlap seal is preferred over an abutting seal, also known as a fin seal. This overlap seal is visually more acceptable and it precludes having the two edges of the laminate extending outwardly from the tube body. However a disadvantage is that the edge of the laminate is exposed to the contents of the tube. If the holographic layer film was a metallized

film it is likely that the contents of the tube would react with the metal of the metallized layer with the result being the delamination of the laminate along the longitudinal overlap seal.

This invention provides a way for tubes to be produced with holographic decoration and to have a strong bond attachment to the shoulder and to have a strong longitudinal seal. There is produced an effective holographic decoration for tubes.

Claims

What is claimed is:

1. A tubular container having a body portion and a shoulder portion, the shoulder portion having a nozzle on one end, the other end of said shoulder portion being attached to said body portion, said body portion having a laminate structure comprising at least one holographic film layer, said holographic film layer being a non-metallized holographic film layer and being overlayed on one side with at least one outer film layer bondable to said shoulder portion.

2. A tubular container as in claim 1 wherein said non-metallized holographic film layer is overlayed on another side with at least one inner film layer, said at least one inner film layer bondable to said at least one outer film layer.

3. A tubular container as in claim 2 wherein said shoulder portion adjacent said body portion is comprised of a polyene, said at least one inner film layer overlaying said holographic film being bondable to said shoulder portion by means of heat.

4. A tubular container as in claim 2 wherein there is an adhesive tie layer between said non-metallized holographic film layer and said at least one outer film layer and between said non-metallized holographic film layer and said at least one inner film layer.

5. A tubular container as in claim 2 wherein said at least one outer film and said inner film overlaying are polyenes.

6. A tubular container as in claim 5 wherein said polyene is one of polyethylene and polypropylene.

7. A tubular container as in claim 2 wherein there are at least two inner film layers, at least one inner film layer being a moisture barrier layer and at least one inner film layer being an organic barrier layer.

8. A tubular container as in claim 1 wherein said holographic film layer is a polyester film layer.

9. A tubular container as in claim 8 wherein said polyester film is one of a polyethylene terephthalate film and polyethylene naphthanate film.

10. A tubular container as in claim 9 wherein said polyester film is a polyethylene terephthalate film.

11. A tubular container as in claim 1 wherein said body portion is comprised of at least one inner film layer on the side of holographic film layer opposite said at least one outer film layer, said at least one inner film layer bondable to said shoulder portion.

12. A holographic laminate film comprising a holographic film layer having at least one inner barrier film layer on one side thereof and at least one outer film layer on the other side thereof, said at least one inner barrier film layer heat bondable to said at least one outer film layer, and heat bondable to a shoulder portion.

13. A holographic laminate film as in claim 12 wherein said at least one inner barrier film layer and said at least one outer film layer are each polyene layers.

14. A holographic laminate film as in claim 13 wherein said polyene of each layer is selected from the group consisting of polyethylene, polypropylene, polybutene, polybutadiene and ethylene-propylene copolymers.

15. A holographic laminate film as in claim 12 wherein between said non-metallized holographic film layer and each of said at least one inner barrier film layer and said at least one outer film layer there is an adhesive tie layer.

16. A tubular container having a tubular body portion having a first end and a second end and a shoulder portion, the shoulder portion comprised of a polyene and having a nozzle on one end and another end of said shoulder portion being attached to the first end of said body portion, said body portion being comprised of at least three film layers, at least one layer being a non-metallized holographic film layer, at least one outer polyene film layer bonded to a first side of said non-metallized holographic film layer and at least one inner barrier film layer bonded to a second side of said non-metallized holographic film layer, a second end of said body portion crimp sealed by the bonding of said at least one inner barrier layer on a first side to itself, said at least one inner barrier film layer bonded to the other end of said shoulder portion to attach said body portion to said shoulder portion.

17. A tubular container as in claim 16 wherein said body portion is comprised of said at least four layers in a longitudinal overlap seal arrangement with an edge of said four layers being in contact with any contents of the tubular container.

18. A tubular container as in claim 16 wherein said holographic film layer is a polyester film layer.

19. A tubular container as in claim 16 wherein said polyene layers are selected from the group consisting of polyethylene, polypropylene polybutene, polybutadiene and ethylene-propylene copolymers.

20. A tubular container as in claim 16 wherein between said non-metallized holographic layer and each of said at least one inner barrier film layer, said at least one outer polyene film layer there is an adhesive tie layer.

21. A tubular container as in claim 20 wherein there are at least two inner barrier film layers with an adhesive tie layer between each of said at least two inner barrier film layers.

1/1

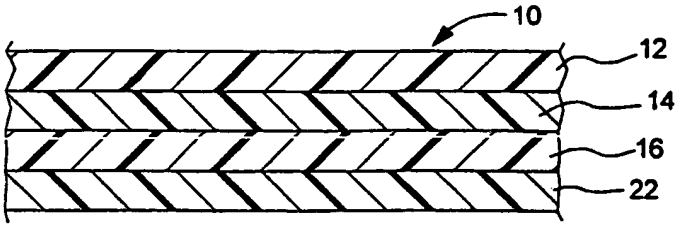


FIG. 1

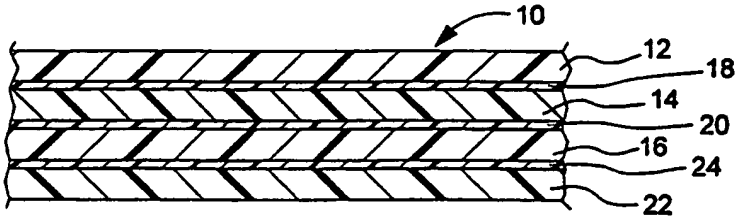


FIG. 2

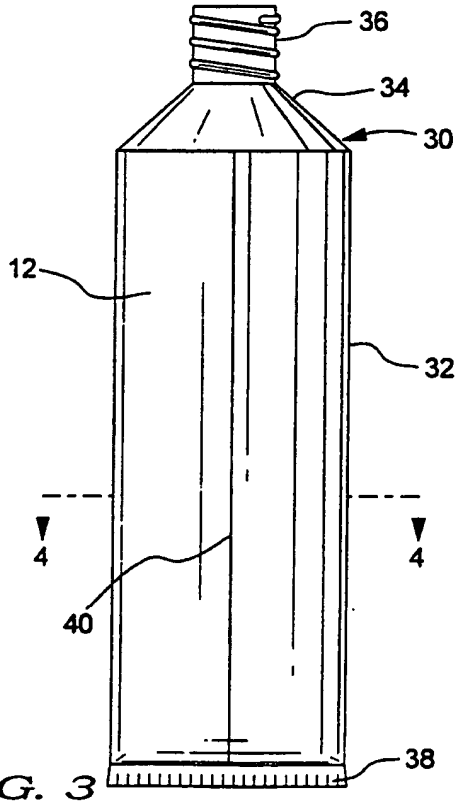


FIG. 3

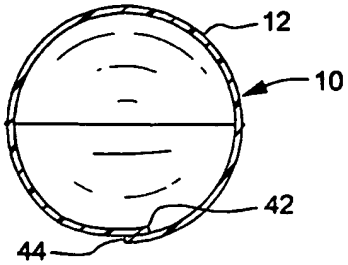


FIG. 4

INTERNATIONAL SEARCH REPORT

Inter xnal Application No
PCT/US 99/19101

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D35/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 93 08084 A (APPLIED HOLOGRAPHICS) 29 April 1993 (1993-04-29) page 1, line 36 - line 38 page 4, line 24 - line 34; claims 1,6,8	12-15 1-11, 16-21
X Y	WO 98 26930 A (MEAUSOONE JEAN PAUL ;THILLEMENT PIERRE (FR); CEBAL (FR); BENQUET J) 25 June 1998 (1998-06-25) page 4, line 13 - line 17 abstract; figure 2; example 1	12-14 1-11, 16-21
A	US 4 921 319 A (MALLIK DONALD W) 1 May 1990 (1990-05-01) column 2, line 43 - line 47	1,15

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 December 1999	24/02/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Zanghi, A

1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 99/19101

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet!

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Inter xnal Application No
PCT/US 99/19101

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9308084 A	29-04-1993	GB 2271300 A,B	13-04-1994
WO 9826930 A	25-06-1998	FR 2757102 A	19-06-1998
		AU 5564198 A	15-07-1998
US 4921319 A	01-05-1990	NONE	